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ABSTRACT

This guide is intended for use in teaching a graphic communications systems. The course has been designed to provide students with an opportunity to assess audiences; design, produce, and deliver printed and photographic messages; and analyze the impacts of these messages. The first two sections discuss the guide's development within the framework of North Carolina's efforts to improve technological literacy and the guide's place as part of an instructional system. A list of the course's major objectives and a course outline are provided next. The remainder of the quide consists of learning modules on the following topics: the nature of graphic communication, designing graphic messages, preparing images for printed graphics, preparing image carriers and producing printed graphic products, preparing to produce photographic messages, and producing photographic messages. Each module includes information about the length of time needed to complete the module, an introduction to the instructional content to be covered in class, performance objectives, a day-by-day outline of student learning activities, related sample charts and worksheets, and lists of suggested textbooks and references. (MN)



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ACKNOWLEDGEMENTS

The North Carolina Technology Education Curriculum is the product of a curriculum redirection process begun in the early seventies. As in any change process, many individuals have contributed their time and energies to provide North Carolina students with a curriculum designed to meet their needs to be technologically literate adult citizens. The following are recognized for their vision and leadership in setting the direction for Technology Education in North Carolina schools.

Members of the N.C. Curriculum Study Taskforce who charted the course for technology education in North Carolina schools. Their study report and recommendations provided the direction for a change in the identity of the discipline and a total redirection of the curriculum.

Members of the N.C. Curriculum Committee who validated the Technology Education Curriculum Guide as appropriate study for assisting students in understanding technological systems impacting on their lives. Further, industry representatives of the committee verified the appropriateness of suggested activities reflective of practices in construction, communications, manufacturing, and transportation.

N.C. Technology Education Association who provided a forum for redirection of the discipline. It was the association that led the profession in changing identity to technology education. The association also provided opportunities for professionals to develop competence in the classroom delivery of technology education through the sponsorship of in-service programs.

Individual technology education professionals who gave leadership to other professionals in the curriculum change process. These professional leaders piloted many technology education activities in their classro ms and served as role models for other professionals.

Members of the N.C. Council of Technology Teacher Educators who provided insite and support th-oughout the curriculum redirection process.

Indiana curriculum developers who provided curriculum materials adopted and adapted for North Carolina Technology Education programs.



INTRODUCTION

The North Carolina Technology Education Curriculum is a program to meet every citizen's need to be technologically literate. Some basic assumptions underlie the program, and these can be divided into content assumptions, and learner assumptions.

The curriculum was developed using the belief that the appropriate content for the field is technology, and its impact on individuals and society. It was further assumed that the content is best organized around human productive systems that have been used, are now being used, and will, most likely, continue to be used. These universal systems are communication, construction, manufacturing, and transportation. Finally, it was assumed that this content can best be addressed from a systems approach with its inputs, processes, outputs, feedback, and goals/restraints.

The curriculum was further based on the assumption that education should meet the needs of individuals and the human requirements of society. It was assumed that each person living in a technological society should have a basic understanding of and the ability to assimilate the knowledge about technology. People it was assumed, should be able to interact with the technological nature of society and help impact the type of future new technologies can provide. Additionally people should be able to be contributors to a society in their several roles, including citizen, voter, investor, consumer, worker, and leader.

These assumptions caused the curriculum to be developed in such a way as to:

- 1. Provide an overview of technology first, allow for more indepth study in specific technological areas, and culminate with synthesis activities.
- Be more teacher-directed, content-centered in early courses, and highly, student-directed, process centered in advanced courses.
- 3. Involve problem-solving and group activities of all courses.
- 4. Stress the how and why of technology and its relationship to our quality of life.
- 5. Be activity-centered learning, with the content being used to determine the appropriateness of each activity selected.
- Be equally important to young women and young men, both of which must function in a technological society.

Finally, the curriculum was developed to be descriptive rather than prescriptive. The materials describe what to teach and suggest ways of teaching the content. At no time are daily activities prescribed in such a way to preclude individualizing the presentations to meet local conditions.



THE CURRICULUM GUIDE IN AN INSTRUCTIONAL SYSTEM

Each course in the North Carolina Technology Education Curriculum is seen as a dynamic activity involving a complete instruction system. This system generally includes seven components: the teacher, the students, a texbook when available, the curriculum guide, laboratory sheets, apparatus, and a reference library.

THE TEACHER

The teacher plays the primary role in the system. This role entails being a curriculum developer. The teacher chooses the points to emphasize and to evaluate. Care should be taken to insure that the coverage of the subject is comprehensive. You should resist "picking and choosing" only modules and activities that are the most interesting, most familiar, or the easiest to implement. All modules and activities should be included. However, you are encouraged to redesign or replace activities with your own activities that contain equivalent content.

As a <u>technical expert</u>, the teacher gives presentations, demonstrations, and asks questions about the subject matter. Safety information, and the demonstration of teaching/learining activities, are the responsibility of the teacher.

The teacher is an instruction manager. Managers plan, schedule, direct, The teacher, perhaps in cooperation with and control activities. students, plan the instruction by identifying the instructional goals. activities to reach these goals are scheduled. presentations and application activities students are directed through the construction activities. Finally, the student's work and the teacher's management is controlled through various evaluation. Since evaluation instruments should be designed to measure success in reaching the goals, these instruments should be prepared by the teacher.

The teacher is the creator of the teaching/learning environment. It is highly recommended that you create a "role playing" environment. In addition to having students do tasks that cimulate construction, have them play the role of workers, managers, and owners. For example, refer to a group of students as a "work crew" or "survey party" with job titles, rather than as students who carry out assigned tasks. Help there visualize themselves in their roles. The teacher can become a job superintendent, owner, or government officer, who approves the "work crew's" job.

THE STUDENT

The target population is made up of middle-junior high or high school students. The students will often work in groups of from three to five. Their responsibilities include reading the textbook assignments, doing the worksheets as homework, and completing the activities.



THE TEXBOOK

A textbook should be selected for the course and each student should have one. A textbook contains the pody of knowledge about industrial technology. It should be selected to meet the appropriate reading level, and be written in an interesting way with numerous illustrations.

THE CURRICULUM GUIDE

The curriculum guide is to be used to help plan your instruction. The introduction consists of a structure for the content and a description of an instructional sy tem with suggestions on how to use it.

The remainder of the curriculum guide briefly describes the modules. Each module consists of an introduction objective(s), and a description of the activities. The description of the activities includes a schedule, presentation titles, application activities, and presentation titles, references, and safety guidelines. Suggestions for getting prepared and carrying out the activity are found in the teacher activity sections.

Suggestions for a variety of optional activities may also be found throughout the curriculum guide.

THE APPARATUS

Often the course guide contains plans for specialized apparatus useful in teaching the course. Drawings will be placed with the activity in which they are used. You can use the drawings to construct the apparatus.

THE REFERENCE LIBRARY

Some courses require student reference books. The titles of these are included in the reference library and copies should be purchased for laboratory use.

DAILY LESSON PLANS AND EVALUATION

The planning of daily activities and an on going evaluation system are the teacher's responsibility and rightfully so. Each student should adapt activities and presentations to insure they help students develop the identified concepts within local conditions. The curriculum guide was designed to help you, the local professional, present a relevant, exciting course. Good luck!



THEROEXICTION

Graphic has been described as being "artistic" or visual. Communication is the transfer of information. Graphic communication, therefore, is the transfer of information of messages through visual means.

Our modern technology offers us two major ways to communicate visually. These systems are printing or printed graphic communications and photography or photographic communications. Both printed graphic and photographic communications are systems. They have inputs (information, ideas, data), processes (designing, preparing for production, producing media messages, delivering messages) and outputs (printed or photographic products). These systems are "an arrangement of things so related as they form a whole." Both systems are versatile, multi-faceted ways to communicate information with a variety of options allowing an almost unlimited opportunity for creative expression.

Merely learning to manipulate printing and photographic materials and equipment is not enough to provide the level of technological literacy and competence required to fully participate in today's society. To be truly educated, each person must understand the impacts of graphic communications on everyday life. Additionally, an understanding of the historical evolution (where we have been, are, and are going) is needed to fully appreciate the entire area.

Possessing the graphic communication skills necessary to communicate effectively is only a fraction of what each person needs to know and be able to do to become a participating member of our rapidly advancing information society.

This course will provide students with an opportunity to assess audiences; design, produce, and deliver printed and photographic messages; and analyze the impacts of these messages.



CAJECTIVES

Upon completing this learning module, each student should be able to understand:

- 1. How messages are designed to interact with the established audience.
- 2. How graphic messages are designed, produced, and delivered.
- 3. The impacts of graphic messages on audiences.
- 4. The major milestones in the development of graphic communications.
- 5. The operation of common equipment and the materials used to produce printed graphic communication products.
- 6. The operation of common equipment and the materials used to produce photographic communication products.

TEXT REFERENCES:

This course was developed around the following text but any good graphic arts textbook which includes units of printing and photography will work. Remember to use the text as a resource to study graphic communications NOT printing and photographic techniques for their own sake!!!

Karnitz, John R., Graphic Arts Technology, Delmar Publishing Co., Albany, NY, 1984.



COURSE OUTLINE

Module Number	Title and Content	Time (Days)
1	Introduction to graphic communication Communication processes Communication systems Development of graphic communications Impacts of graphic communications	5
2	Designing graphic messages Audience assessment Message placement—media Design elements Creating a total design	13
3	Preparing images for printed graphics Estimating costs and materials Image generation and assembly Cold image generation Line process photography Halftone process photography Images for screen processes Relief images	15
4	Preparing image carriers and producing printed graphic products Image carriers Lithographic image carriers Screen image carriers Lithographic image transfer Screen image transfer Relief image transfer Finishing products	აი
5	Preparing to produce photographic messages Planning photographic messages Storyboarding Composing and describing shots	18
6	Producing photographic messages Photography as communications Cameras and films Exposing and developing film Producing prints Producing projection photographs	17



INTRODUCTION TO GRAPHIC COMMINICATION CONTENT OUTLINE

- Introduction to Graphic Communication Systems I.
 - Define graphic communication
 - The communication process
 - 1. Sender
 - 2. Channels
 - 3. Receiver
 - 4. Feedback
 - 5. Storage
 - 6. Interference
 - C. Graphic (visual) systems
 - 1. Technical
 - a. Sketching
 - b. Mechanical drawing
 - c. Pictorial views
 - 2. Printed graphic
 - a. Relief

 - b. Screen printingc. Intaglio (Gravure)
 - d. Electrostatic
 - e. Lithography
 - 1. Specialty
 - - (1) Ditto
 - (2) Thermal
 - (3) Heat transfer
 - (4) Laser
 - (5) Mimeograph
 - 3. Photographic
 - a. Continuous tone
 - (1) Motion pictures

 - (2) Still
 (3) Video tape
 - b. Process (halftone)
 - Impacts of graphic communication systems
 - 1. Evolution of graphic media
 - 2. Development of graphic processes
 - 3. Uses/impacts of graphic products
- II. Pesign of Graphic Messages
 - A. Visual design elements
 - 1. Lines
 - 2. Shapes
 - 3. Size/proportion
 - 4. Texture
 - 5. Balance
 - 6. Color



CONTENT CUTLINE—Continued

- B. Visual literacy
 - 1. Perception
 - 2. Aesthetics
 - 3. Understanding
 - 4. Function
- C. Design in Graphic Communication
 - 1. Audience assessment
 - 2. Message placement
 - 3. Creativity
 - 4. Design analysis

III. Generation of Graphic Masters

- A. Preparing masters/image carriers
 - 1. Layout
 - 2. Paste-up
 - 3. Stripping-in
 - 4. Stencil preparation
 - 5. Preparing masters
- B. Producing the master
 - 1. Product development processes
 - 2. Image assembly
 - 3. Image conversion

IV. Producing Printed Graphic Products

- A. Image carriers
 - 1. Lithographic plates
 - 2. Cold composition masters
 - 3. Screens
 - 4. Foundry type
 - 5. Other
- B. Image transfer
 - 1. Printing
 - 2. Duplication
 - 3. Copying
- C. Finishing products
 - 1. Finishing activities
 - a. Outting
 - b. Folding
 - c. Binding
 - d. Collating
 - 2. Production
 - a. Assembly
 - b. Packaging



CONTENT CUILINE—Continued

- Planning of Photographic Messages ٧.
 - Creating visual messages
 - 1. Visualization
 - 2. Composition

Photographic design processes

- 1. Composing scenes
- Storyboarding
 Animation frames
- 4. Layout
- C. Preparing to produce the messages
 - 1. Films
 - 2. Cameras
 - 3. Supplies/equipment
 - 4. Developing materials
- Producing Photographic Messages VI-
 - Types of photographic systems
 - 1. Continuous tone
 - 2. Process
 - 3. Other
 - B. Equipment/supplies
 - 1. Cameras
 - 2. Lens
 - 3. Films
 - 4. Recorders
 - 5. Receiver paper
 - 6. Developing chemicals
 - C. Preparing to produce message
 - 1. Lighting
 - 2. Scenery
 - 3. Special effects
 - D. Producing the message
 - 1. Recording
 - a. Photographing
 - b. Filming
 - Developing/printing
 - 3. Editing
 - 4. Final assembly



GRAPHIC COMMINICATION SYSTEMS

MODULE: 1 : Introduction to Graphic Communication

LENGTH: 5 DAYS Graphic Communication CLUSTER

Graphic communications may be defined as the transfer of information through arrays of symbols such as graphs, letters, numerals, drawings, and pictures.

Graphic communication involves both a study of printed and photographic products, and the industries involved with these. This includes publishing, commercial printing, packaging, commercial photography, film, and related industries.

Graphic communications is an important social and cultural influence. It is an opinion influencer and disseminator of information. It provides means for instruction and enter+ainment. It is one of the largest industries in the United States, and is a pivotal factor in our new "information age."

All types of graphic communication systems may be demonstrated by application of the communication process model. This model was presented in generic form in the "Introduction to Communication Systems" course, but should be individualized to the graphic systems within this course and module.

This module is presented to provide an overview of the graphic communication system and to provide experiences with processes unique to this system.



OBJECTIVES

Upon completing this learning module, each student should be able to:

- 1. Define graphic communication and its related elements.
- 2. Relate the general communication model to the specifics of graphic communication systems.
- 3. Become familiar with the types of products that are produced by the graphic communications industry.
- 4. List and understand the important epochs in the evolution of graphic communications.
- 5. Become familiar with the various types of businesses that make up the graphic communications industry.
- 6. Develop an understanding of the various ways graphic communication impacts and influences our culture and society.



CALENDAR

DAY ACTIVITY

1 Complete administrative details to start class.

Define and discuss graphic communication systems.

- Discuss the scope, and impact graphic communication has. Give various examples of each type of product (printed and photographic).
- 3 Trace the evolution of graphic communication systems.
 - A. Printed graphic communications.
 - B. Photographic communications.
- Present and discuss information on how the system impacts our lives (i.e., opinion, entertainment, environment, and social effects).



DAY ACTIVITY

- O Complete the administrative details to start the class.
- The instructor should define graphic communications as the transfer of information through technical graphic means.

Explain the communications process (communications model) as it relates to graphic messages.

Explain how graphic communication occurs using specific examples (billboards, greeting cards, etc.).

The students, working individually or in small groups, complete the "Graphic Communication Process" worksheet. (A sample sheet is included in this module.)

For each media listed indicate the following: (1) sender, (2) transmitter, (3) channel, (4) receiver, (5) destination, and (6) potential noise sources.

2 The instructor should explain graphic communications systems such as offset printing, screen printing, black and white photography, color slides, computer graphics, etc., and show examples of each.

Explain under what circumstances each system might be the best choice to use to convey the message in the most effective manner.

The students, working individually, should complete the "Graphic Systems" worksheet.

Based on the information presented in the teacher-led discussion, the students should list a production method for each listed product (i.e., silkscreen for billboard).

Give assignment for Day 3 as homework.



UZĀ

ACTIVITY

The instructor should discuss the evolution, using timelines, of both printed graphic and photographic communication systems. Show examples, or pictures of these processes and products. (i.e., cave printing, old alphabets, Gutenburg Bible, Ben Franklin newspaper tavern signs, early photos—Lincoln, etc.)

Each student should be assigned a decade on the timeline for graphic communication. They should then identify one or more major advancements in graphic communication.

Make a timeline on a long piece of Butcher paper. Record the student's discoveries on the timeline. Add other important dates not found by the students.

The instructor should discuss and show examples of graphic information dissemination, opinion, influence, and entertainment (newspaper and magazine stories, books, editorials, editorial cartoons, advertisements, comic strips, photos that entertain, influence, or inform).

Discuss environmental and social effects of graphic communication.

The students should:

- Prepare a collage of famous logos from magazines, newspapers, etc. They may be divided into logos which are: (1) words,
 (2) symbols (3) words and symbols.
- 2. Cut out examples of printed materials which:
 - a. give information
 - b. try to influence opinions
 - c. entertain.
- 3. Complete the "Impacts" worksheet listing the major and secondary invents of various graphic communication media.



DAY

ACTIVITY

- 4. Complete the "To Whom Are You Selling" by
 - a. Dividing the class into groups of four.
 - b. Assign each group a product.
 - c. Assign each member in the group on "age group" to design an advertisement for the assigned product.

APPENDIX	
Produce a workshee	that looks like this:
	Graphic Communication Process Worksheet
Name	Pariod

	Sender	Transmitter	Channel	Receiver	Destination
Newspaper Story					
TV Commercial	<u> </u>				
Photo in Magazine		·			
Music Video					
Textbook	<u> </u>	-			
Blueprint of a House	<u> </u>			 	
 Comic Strip					
Bumper Sticker					
Highway Sign	<u> </u>				
 Movie					
Advertisement in Magazine					
P.A. System in Stadium					
Label on a Can of Food					
Printed T-Shirt				_	
Turn Signal on a Car					
			-		



ROIX	
	SCHOOL
C	GRAPHIC SYSTEMS WORKSHEET
Name	Period
If you had to produce a/an:	What production method would you use?
Billboard	
Bumpersticker	
Greeting card	
TV station— "Station Break" logo	
Road sign	
Newspaper	
Printed T-shirt	
	



BIBLIOGRAPHY

- The suggested text for this course (along with specific chapters/pages for this module) is listed below:
- Karsnitz, J. R., Graphic Arts Technology, Delmar Publishing Co., Albany, Ny, 1984, (Chapter 1, pp. 3-15).
- Other texts and reference books which apply to this course include the following:
- Broekhuizen, R. J., Graphic Communications, McKnight Publishing Co., New York, 1980, (Chapter 1, pp. 8-16).
- DuVall, J. B., G. R. Maughan, & E. G. Berger, Getting the Message, Davis Publications, Worcestor, MA, 1981, (Module 5, pp. 85-130).
- Jones, R. E., & J. L. Robb, Discovering Technology: Communication, Harcourt Brace Jovanovich, Publishers, Orlando, FL, 1986, (Chapter 10, pp. 111-121).
- Seymour, R. D., J. M. Ritz, & F. A. Cloghessy, Exploring Communications, Goodheart-Willcox, Inc., South Holland, IL, 1987, (Chapter 12, pp. 133-121).
- Spence, W. P., & D. G. Vequist, Graphic Reproduction, Bennett Publishers, Peoria, IL, 1982, (Chapter 1, pp. 30-35; Chapter 2, pp. 39-55).
- Swerdlow, R. M., Introduction to Graphic Arts, ATS, Chicago, IL, 1975, (Chapter 1, pp. 1-7).



RIHLIOGRAPHY

Free Materials Available to the Instructor

Eastman Kodak 343 State Street Rochester, NY 14650

Upon recognition of you as a new instructor, they will send curriculum development materials, lists of movies/slide shows available free of charge, magazines and other literature at no charge. As you read this preliminary information, you will be given information on how to get further, more detailed information from Kodak.

Free Magazines Available to the Instructor

In-Plant Reproduction

Kodak's Studio Light

Graphic Arts Monthly

Printing Impressions

Functional Photography P. O. Box 13213 Philadelphia, PA 19101

Ilford Corporation West 70 Century Road Paramus, NJ 07653



GRAPHIC COMMINICATION SYSTEMS

MODULE: 2 : Designing Graphic Messages

LENGIH: 13 DAYS Communications CIUSTER

In the preparation of any type of graphic messages, the first steps are always similar. These steps are:

- 1. Decoding information from the intended audience.
- 2. Development of an aesthetically pleasing design based upon this audience assessment.
- 3. Selection of the optimum medium to deliver the message.

All three steps are involved with designing an effective message based upon an originating idea.

Decoding information from an intended audience is important, as it allows the designer to understand the perspective and needs of the viewer. Without this knowledge, the designer is forced to use the ineffective shotgun approach. Knowledge of the design process and design elements is necessary in order to allow the creator to have the ability to produce an "eye-catching," motivating, and therefore useful message. Knowledge of media selection is important since it allows the student the breadth of information necessary to correctly market the message.

Design is fundamental to most message encoding techniques, especially those involved in the printed graphic communication system.



OBJECTIVES

Upon completing this learning module, each student should be able to:

- 1. Understand the importance and placement of audience assessment within the graphic communication model.
- 2. Describe why audience assessment is important to message design.
- 3. Describe some of the various types of audiences and their unique tastes.
- 4. Be able to assess audience and establish an appropriate theme.
- 5. Know how to choose the best media to carry the message.
- 6. Be able to develop the appropriate message for a given audience.
- 7. Understand the design principles and processes involved in creating a graphic message.



CALENDAR

DAY ACTIVITY Discuss the importance and need for designing messages, emphasizing 1-3 audience assessment. Explain audience assessment assignment. Review data derived from audience assessment. 4 5 Discuss "message placement." 6 Introduction to design processes. Introduction to design elements. 7-8 Presentation "Creating a Total Design." 9

10-13 Supervise student creations.



DAY

ACTIVITY

1-3 The instructor should explain how getting a message across to various segments of society will differ.

Discuss the variety of approaches used to reach:

- 1. Youth—excitement, fun, popularity, etc.
- 2. Young adults—establishing a home, getting ahead, job security, etc.
- 3. Middle-aged adults—financial security, education of children, etc.
- 4. Senior citizens—security, medical costs, freedom from worry, peace of mind, etc.

The students should:

Participate in the discussion of audience assessment.

In groups of 3-4 students, prepare a sample sheet for: (1) colors, (2) pictures, and (3) styles of lettering.

You may have one group prepare one set of samples for all groups. For example, group "A" may make a color sample sheet for all the groups.

The sample sets should be as follows:

- 1. Color—samples of advertisements, packages, etc. Each sample item should have one predominant color.
- 2. <u>Picture</u>—samples of various types of pictures including:
 (a) scenic, (b) people, (c) line drawings, (d) animals,
 (e) cartoons, and (f) abstract.



DAY

ACTIVITY

3. Style of letters—select several which represent contemporary, traditional, etc.

You, as teacher, may collect a large selection of examples from which the student selects items. Encourage them to bring in additions to the sample set.

Have the students use the sample set and the worksheet to assess audience reactions to the various samples. (This should be done both with in-school or outside audiences.)

4 The instructor should summarize the results on a large chart and discuss conclusions.

The students will present to class the results of the audience assessment and will participate in discussions on the topic.

5 The instructor should explain that in order to reach a particular audience the message has to be put in the appropriate place.

Contrast advertisers in:

- Local newspapers and local stores (department, supermarkets, etc.) with cigarettes (banned from TV), etc. Bring in newspaper.
- 2. News magazine
- 3. Women's magazine
- 4. Home or garden magazine
- 5. Popular Mechanics, electronics, science, etc.
- 6. Wall Street Journal
- 7. Industrial magazines (free, sent to companies)
- 8. Business magazines (Forbes, Business Week, Fortune).



DAY

ACTIVITY

- 9. USA Today newspaper (national newspaper)
- 10. Billboards
- 11. Children's magazines (Jack and Jill, etc.)

The students should participate in discussion on "Reading the Market."

Individually or in groups of 2-3, the class members should make composite lists of where to reach audiences of various age groups using the "Message Placement" worksheet.

The instructor should discuss the concepts of bringing out a creative idea through the design process. Present: (1) thumbnail sketch, (2) the rough diagram, and (3) the comprehensive, as means of brainstorming an idea.

Tie in the design process with information obtained from audience assessment.

The students will develop 15 thumbnail sketches for a magazine advertisement which reaches various groups. See worksheet in Appendix.

- 7-8 The instructor should explain and show examples of the elements of design
 - 1. Balance
 - 2. Proportion
 - 3. Contrast
 - 4. Rhythm
 - 5. Unity



DAY

ACTIVITY

- 6. Texture
- 7. Color
- 8. Line
- 9. Shape
- 10. Mood.

Show examples of advertisements, packages, album covers, etc., which show each design feature.

The students will participate in design element discussion.

Class members should complete and display "Design Elements" worksheet.

Class members could develop roughs from previously developed thumbnails.

9 The instructor should select an outside resource person, art teacher, yearbook editor, etc., and have him/her discuss the process of "creating a total design."

The students should participate in discussion on "Creating a Total Design."

10-13 The instructor should select an upcoming school event such as a track meet, a dance, or a band concert.

Divide the class into groups of four. Have the group select a theme for the printed material to support this event such as: "Run to the 8th Annual Cross Country Meet."

Have the group determine four items they will produce, such as T-shirts, tickets, posters, programs, flyers, etc.

Assign one item to each student in the group and have him design the item using:

- 1. Rough sketches
- 2. Refined sketches



DAY

ACTIVITY

3. Comprehensive layout

In each group of four, the students should

- 1. Select a leader
- 2. Identify a theme for the assigned event
- List the products (programs, poster, etc.), which will be produced.

Complete and present designs for the identified products incorporating the theme in each one.



SCHDOI
APPENDIX

AUDIENCE ASSESSMENT TALLY SHEET

Name		Pericd_	Period		
Rank the items best "2," etc.		set with the one you	like best as "l," next		

	4-8 year		1	Senior
	ಂ1 ಡೆತ	Teenager	Middle age	Citizen
Colors				
Example 1		<u> </u>		
Example 2		! 		
Example 3		! 		
Pictures		<u> </u>		
Scenic				
Animal				
Cartoon			<u> </u>	
People				
Line Drawing				
Abstract		<u> </u>	<u> </u>	
Lettering				
Example 1				
Example 2				
Example 3	İ		<u> </u>	
Example 4		<u> </u>	<u> </u>	



PPRDIX			
	SCHOOL		
	MESSAGE PLACEMENT		
Name	Period		
Where would you place a quite following audiences—	graphic (printed) message so that it would reach bring in examples.		
Pre Teen Children			
Teenager			
Young Adults	·		
Middie Age Adults			
Senior Citizens			



-	SCHOOL
Name	Period
Design a magazine advertisement groups.	to sell the same product to various age
Product:	
	T
TEENAGERS	YOUNG ADULT
MIDDLE AGE	ELDERLY



APPENDIX

PPENDIX		
	SCHOOL DESIGN ELEMENTS	
Name	Period te a freehand sketch which shows each of the	
Balance	Texture	
Proportion	Color	
Contrast	Line	
Rhythm	Shape	
Unity	Mood	



BIHLIOGRAPHY

The suggested text for this course (along with specific chapters/pages for this module) is listed below:

Karsnitz, J. R., <u>Graphic Arts Technology</u>, <u>Delmar Publishing Co.</u>, <u>Albany</u>, Ny, 1984, (Chapter 4, pp. 33-41 & Chapter 5, pp. 42-54).

Other texts and reference books which apply to this course include the following:

- Broekhuizen, R. J., Graphic Communications, McKnight Publishing Co., New York, 1980, (Chapter 2, pp. 24-50).
- Jones, R. E., & J. L. Robb, <u>Discovering Technology: Communication</u>, Harcourt Brace Jovanovich, Publishers, Otlando, FL, 1986, (Chapter 11, pp. 122-132).
- Seymour, R. D., J. M. Ritz, & F. A. Cloghessy, Exploring Communications, Goodheart-Willcox, Inc., South Holland, IL, 1987, (Chapter 13, pp. 122-130).
- Spence, W. P., & D. G. Vequist, <u>Graphic Reproduction</u>, <u>Bennett Publishers</u>, Peoria, IL, 1982, (Chapter 5, p. 69).
- Swerdlow, R. M., <u>Introduction to Graphic Arts</u>, ATS, Chicago, IL, 1975, (Chapter 3, pp. 36-55 & Chapter 4, pp. 62-74).



GRAPHIC COMMINICATION SYSTEMS

MODULE: 3 : Preparing Masters for Graphic Messages

LENGTH: 15 DAYS Communication CLUSTER

Once the printed graphic message is designed there are a number of tasks which must be completed before the product can actually be printed. These include:

- 1. Costs must be estimated.
- 2. Production must be scheduled.
- 3. Images must be generated and assembled.
- 4. Images must be converted.

These activities are different for each major type of printing—relief, lithography, intaglio, screen, and electrostatic. The differences and similarities among the preparation tasks for these types of printing will be studied during this module.

Students will prepare several images which will be used to produce image carriers in the next module. This and the next module can be treated as interrelated and sequential learning activities.



OBJECTIVES

Upon completing this learning module, each student should be able to:

- 1. Determine material needs for a printed graphic product.
- 2. Estimate the costs of these materials.
- 3. Describe the various types of image generation methods.
- 4. Generate and assemble images for selected printing processes.
- 5. Describe the steps and equipment used for image conversion.
- 6. Convert images for preparing image carriers for selected printing processes.
- Compare and contrast the image generation, assembly, and conversion for the common printing processes.



CALENDAR

DAY	ACTIVITY			
1	Discuss the product development process.			
	Introduce cost estimating.			
2	Assign cost estimating assignment.			
3	Discuss image generation.			
	Introduce cold-image generation techniques.			
4-6	Demonstrate cold-image generation techniques.			
7	Demonstrate image assembly.			
8	Introduce image conversion techniques and equipment.			
}- 11	Demonstrate line-process photography.			
12	Demonstrate cold-image preparation for silkscreen.			
13	Introduce silkscreen image assignment.			
14	Demonstrate preparing relief images.			
15	Introduce block printing image preparation activity.			



DAY

ACTIVITY

- Well before this module is introduced, the following tasks should be completed:
 - 1. Prepare laboratory activities for:
 - a. cost estimating
 - b. cold-image generation
 - c. line photography processes
 - d. silkscreen processes
 - e. block printing.
 - 2. Tie design assignment for previous module with this module.
- 1 The instructor should discuss the sequential steps of:
 - 1. audience assessment
 - 2. design
 - 3. image generation
 - 4. image assembly
 - 5. image conversion
 - 6. image carrier preparation
 - 7. image transfer
 - 8. product finishing.

Introduce cost estimating including the cost of materials, labor, overhead.

The students should participate in the product development discussion and participate in the cost estimating discussion.

The instructor should finish discussing the process of cost-estimating, and provide assignments similar to those in Karsnitz, pp. 67-73.

The student should complete the cost estimating assignment.



DAY

ACTIVITY

The instructor should discuss image generation and assembly. Include composition, copy fitting, and printing measurement.

Introduce cold/photographic composition, including press type, Kroy, strike-on, and photo typesetting.

The student should participate in the image generation and assembly discussion and participate in the introduction to cold image generation and assembly.

4-6 The instructor should demonstrate as many cold-composition techniques as available. Have students participate in demonstration. Include instruction/procedure sheet for each technique demonstrated.

The student should observe the demonstration and take notes in preparation for the laboratory assignment which could be using cold type (Kroy, press type, strike—on type), clip art, and original line drawings, or prepare an image for a greeting card for (holiday) which would appeal to (age group).

The instructor should demonstrate image assembly into a mechanical St.w and demonstrate equipment used (triangles, waxer) and discuss protocols for assembly (use of blue image area lines, trim marks, etc.).

The student should participate in demonstration of image assembly, and assemble generated images into a mechanical.

The instructor should discuss image conversion—line and halftone processes. The photographic background (how film works, etc.) will be presented later in this course. The instructor should also demonstrate line conversion and stripping.

The student should participate in the discussion on image conversion and observe the demonstration of line process photography and take complete notes.

9-11 The instructor should demonstrate and provide activity sheets for laboratory assignments and supervise students' laboratory activity.

Demonstrate halftone processes.

Supervise students' laboratory activity.



DAY

ACTIVITY

The students should convert the image developed during days 4-6 using line process photography and observe the demonstration of halftone process photography.

The instructor should demonstrate cold-image preparation for silkscreen processes—press type, India ink drawings, etc.

The student should observe the demonstration on preparing an image for silkscreen processes and take complete notes.

The assignment might be to prepare an image to produce a bumper sticker for (event or organization).

OR

To prepare an image to produce a silkscreened shirt.

13 The instructor should monitor student work.

The student should prepare a silkscreen image.

14 The instructor should demonstrate cutting a relief block for printing.

The student should observe a demonstration on relief image preparation (block printing).

15 The instructor should supervise students as they complete the silkscreen assignment or cut a block.

Provide a quiz on image generation/assembly/conversion.

The student should complete silkscreen activity on relief activity and participate in quiz.



RIPLIOGRAPHY

- The suggeste text for this course (along with specific chapters/pages for this module) is listed below:
- Karsnitz, J. R., <u>Graphic Arts Technology</u>, Delmar Publishing Co., Albany, Ny, 1984, (Chapter 9, pp. 93-124; apter 20, pp. 285-305; Chapter 21, pp. 307-372; Chapter 22, pp. 325-34) & Chapter 23, pp. 341-355).
- Other texts and reference books which apply to this course include the following:
- Broekhuizen, R. J., <u>Graphic Communications</u>, <u>McKnight Publishing</u> 70., New York, 1980, (Chapter 10, pp. 295-282 & Chapter 4, pp. 84-140).
- DuVall, J. B., G. R. Maughan, & E. G. Berger, <u>Getting the Message</u>, Davis Publications, Worcestor, MA, 1981, (Module 2, pp. 17-46).
- Jones, R. E., & J. L. Robb, <u>Discovering Technology: Communication</u>, Harcourt Brace Jovanovich, Publishers, Orlando, FL, 1986, (Chapter 12, pp. 133-145 & Chapter 15, pp. 170-182).
- Seymour, R. D., J. M. Ritz, & F. A. Cloghessy, <u>Exploring Communications</u>, Goodheart-Willox, Inc., South Holland, IL, 1987, (Chapter 14, pp. 131-138 & Chapter 15, pp. 139-149).
- Spence, W. P., & D. G. Vequist, <u>Graphic Reproduction</u>, Bennett Publishers, Peoria, IL, 1982, (Chapter 6, pp. 104-140; Chapter 9, pp. 162-180; Chapter 10, pp. 185-205, & Chapter 12, pp. 233-250).
- Swerdlow, R. M., Introduction to Graphic Arts, ATS, Chicago, IL, 1975, (Chapter 5, pp. 83-93; Chapter 6, pp. 118-147 & Chapter 7, pp. 156-175).



GRAPHIC COMMUNICATION SYSTEMS

MODULE: 4: Preparing Image Carriers and Production

LENGTH: 20 DAYS Communication CLUSTER

The third major step after image design and image preparation involves the preparation involves the preparation of image carriers and actually printing the desired product. This activity includes:

- 1. Preparing an image carrier
 - a. making lithographic image carriers
 - b. making screen image carriers
 - c. making relief image carriers.
- 2. Transferring the image
 - a. lithographic image transferring
 - b. screen image transferring
 - c. relief image transferring.
- 3. Finishing the product

sizing

orming

- c. assembling
- d. binding
- e. packaging.

This module will produce printed products from the images prepared in the previous module. Studer s will prepare image carriers, transfer the images to selected substrate, and finish the product.



OBJECTIVES

Upon completing this learning module, each student should be able to:

- 1. Describe the tasks involved in producing a completed printed product from a prepared image.
- 2. Prepare an image carrier for selected printing processes.
- 3. Transfer an image to a substrate using salected printing processes.
- 4. Describe the purposes and uses for finishing.
- 5. Use an appropriate finishing technique.



CALENDAR

ACTIVITY DAY 1 Discuss the preparation of image carriers. 2 Discuss and demonstrate preparing a lithographic image carrier. Discuss and demonstrate preparing a screen image carrier. Discuss and demonstrate laboratory assignments for carrier 3 preparation. Supervise student work. 4-6 Discuss and demonstrate lithographic image transfer. 7-8 Discuss and demonstrate screen image transfer. 9 10-15 Supervise work on lithographic and screen image transfer. Discuss and demonstrate relief image transfer. 16 17 Supervise work with relief transfer. Discuss importance and steps of product finishing. 18 19-20 Supervise student finishing.





DAY

ACTIVITY

Well before introducing this learning module, the following tasks should be completed.

Prepare discussions on:

- 1. preparing image carriers
- 2. finishing products.

Prepare discussion/demonstrations on:

- 1. lithographic image carriers
- 2. screen image carriers
- 3. lithographic image transfer
- 4. screen image transfer
- 5. relief image transfer
- 1-2 The instructor should:

Discuss image carriers—types, advantages, and disadvantages, etc.

Demonstrate preparing a lithographic image carrier including both electrostatic and traditional plates (if possible). Show exposing, developing.

Demonstrate preparing screen image carriers (photographic type is best). Show exposing, developing, mounting, and masking screens.

Note: Demonstrate both processes so that the class can be divided into groups to relieve pressure on one type of equipment. Some students can work on lithographic processes while the others work on screen processes.

The student should:

Participate in discussions on image carriers.

Participate in the discussions/demonstrations on:

- 1. Preparing lithographic image carriers.
- 2. Preparing screen image carriers.



DAY

3 The instructor should discuss laboratory assignments. For example:

ACTIVITY

Use the lithographic (or screen) image prepared in the previous module and produce an image carrier.

The students can work individually or in pairs to complete this assignment.

The students should participate in discussion explaining laboratory assignments.

4-6 The instructor should supervise the students as they prepare their image carriers. (Be sure that the students budget their time so that they will finish both image carriers.)

The students should prepare a lithographic carrier for the product from the previous module, and prepare a screen carrier for the product from the previous module.

7-8 The instructor should discuss and demonstrate lithographic image transfer. Emphasize the safe and proper use of tools and machines used to print the finished product. Stress the concepts involved with any offset press (i.e., inking, dampening, registration, feeding, receiving, and printing).

The students should participate in demonstration of lithographic image transfer, and feed 100 sheets of paper through the press to gain experience in setting up feeding and receiving systems.

DAY

ACTIVITY

9 The instructor should discuss and demonstrate screen ime a transfer.

Emphasize the proper and safe use of tools and machines used to print the finished product.

The students should participate in the demonstration of screen image transfer. Take careful notes.

10-15 The instructor should supervise the students as they complete their laboratory activities. Be sure that they budget their time so that they print both types of products. The students may be grouped so that they can help each other complete their assignments.

The students should produce a product using lithographic image transfer, and produce a product using screen image transfer.

16 The instructor should discuss relief printing and demonstrate block cutting.

The students should participate in the discussion and demonstration on relief image transfer.

17 The instructor should assign those students who have the time to cut a block of a logo for the school, club, or other organization.

OR

Prepare a block to print an original drawing.

The students should complete screen and/or lithographic printed products.

OR

Produce a product using relief printing.



DAY

ACTIVITY

- 18 The instructor should discuss and demonstrate common finishing processes including:
 - 1. trimming and sizing
 - 2. forming
 - 3. assembling
 - 4. binding.

Participate in the discussion/demonstration on finishing processes.

19-20 The instructor should supervise students work as they complete printing and finishing their assigned products.

The students should complete all work on screen, lithographic, and relief printed products.



RIBLIOGRAPHY

The suggested text for this course (along with specific charters/pages for this module) is listed below:

Karsnitz, J. R., <u>Graphic Arts Technology</u>, <u>Delmar Publishing Co.</u>, <u>Albany</u>, <u>Ny</u>, 1984, (Chapters 20-29, pp. 285-441)

Other cats and reference books which apply to this course include the following:

- Broekhuizen, R. J., <u>Graphic Communications</u>, <u>McKnight Publishing Co.</u>, <u>New York</u>, 1980, (Chapter 7, <u>Units 20-28</u>; <u>Chapter 9</u>, <u>Units 33-41</u> & <u>Chapter 12</u>, <u>Units 52</u>, 55, 56)
- Jones, R. E., & J. L. Robb, <u>Discovering Technology: Communication</u>, Harcourt Brace Jovanovich, Publishers, Orlando, FL, 1986, (Chapters 12-15, pp. 122-182).
- Seymour, R. D., J. M. Ritz, & F. A. Cloghessy, Exploring Communications, Goodheart-Willox, Inc., South Holland, IL, 1987, (Chapters 14-15, pp. 131-149 & Chapter 17, pp. 161-168).
- Spence, W. P., & D. G. Vequist, <u>Graphic Reproduction</u>, Bennett Publishers, Peoria, IL, 1982, (Chapter 14, pp. 309-330; Chapter 15, pp. 341-353; Chapter 24, pp. 620-629, & Chapter 23, pp. 561-612).
- Swerdlow, R. M., Introduction to Graphic Arts, ATS, Chicago, IL, 1975, (Chapter 8, pp. 184-220; Chapter 9, pp. 224-264, & Chapter 11, pp. 294-304).



GRAPHIC COMMINICATION SYSTEMS

MODULE: 5 : Planning to Produce Photographic Messages

LENGTH: 10 DAYS Communication CLUSTER

Similar to printed graphics, preproduction steps are necessary when producing photographic messages. These steps involve pre-visualizing and planning the photographic before the actual production of the picture.

This module will deal with these planning decisions and will bring the learner from a loose idea into a final pre-visualized form ready for exposure.

Additionally, design elements unique to photographic composition will be discussed and demonstrated.



OBJECTIVES

Upon completing this learning module, each student should be able to:

- 1. Describe the steps of photographic systems and their associated equipment.
- 2. Explain the elements of visual design unique to the photographic system.
- 3. Develop an idea onto a storyboard, defining all critical elements.
- 4. List the process-types of the photographic system.



CALENDAR

DAY	ACTIVITY
1	Introduce and present the steps involved with "planning photographic messages."
2	Presentation on storyboards and the critical elements of pictures.
34	Describe composing and describing shots. Present assignment.
5-7	Supervise student work with storyboarding.
8	Presentation—different types, and uses for, photographic systems.
9	Presentation—motion picture cameras and projectors.
10	Supervise animation assignments.



DAY

ACTIVITY

- 1 The instructor should present the steps in planning a photographic message and stress the photographic message as a communication medium. These steps include:
 - 1. idea
 - 2. pre-visualization/composing
 - 3. exposing the negative
 - 4. developing the negative
 - 5. exposing the positive
 - 6. developing the positive
 - 7. finishing and pre-litation.

The student should participate in the discussion and oring in pictures from home to discuss how pictures tell a story.

2 The teacher should present a discussion on storyboarding. Describe the use of a storyboard and demonstrate the techniques for producing a storyboard.

Discuss the critical elements of a picture (i.e., shot angle, distance, framing). Use student pictures for examples.

The student should analyze pictures from home for the discussed elements of prints.

3-4 The instructor should present and show information on use of visual design unique to photography. Discuss rule of thirds, break-lines, mergers, dimension, and color.

Present storyboard assignment.



DAY

A IVITY

The students should select pictures from magazines that show excellent and poor use of each visual design rule. Present these prints to the class.

5-7

The instructor should supervise students working on storyboard assignment.

The students should produce a 12-frame sketched storyboard (use storyboard worksheet) entitled "How to..." (title to be completed by the student). This will later be turned into a storyboard made up of photographs.

Prepare a "shot chart" to accompany storyboard. Each shot should be fully planned.

- 8 The instructor should discuss the various types of photographic systems. Compare and contrast each. These include:
 - 1. black and white prints
 - 2. black and white reversals
 - 3. color prints
 - 4. color reversals.

Stress the impact and use for each system.

The students should participate in the discussion and bring in photographs from home that use each system.

9-10 The instructor should describe how motion picture cameras and projectors work to produce movement and explain the animation assignment.



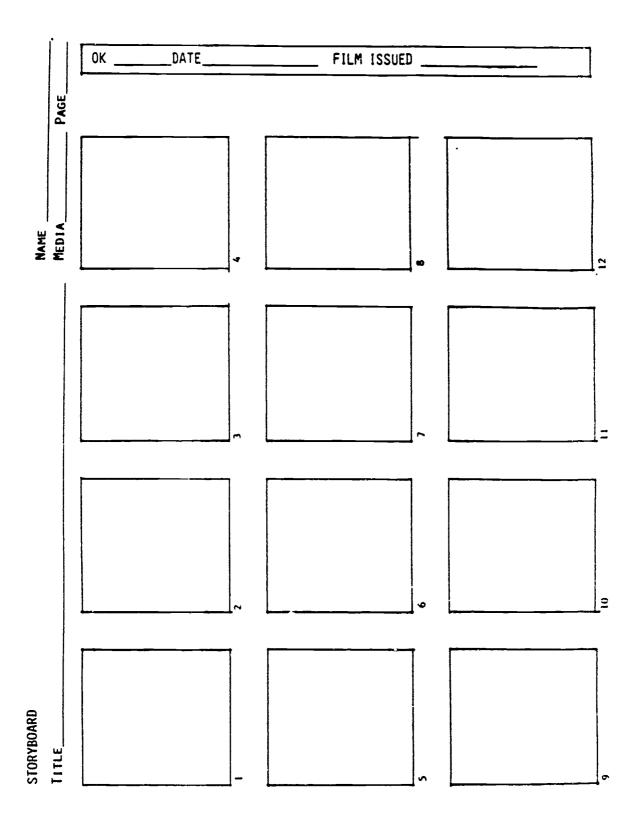
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ACTIVITY

The students should experiment with hand drawn animation. A 240 frame segment of old 16mm film (cut film longer to allow for a "leader" segment) with emulsion bleached off will give students 10 seconds of animation time. If 16mm film is not available "flip books" can be produced easily by students.



APPENDIX



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BIHLIOGRAPHY

The suggested text for this course (along with specific chapters/pages for this module) is listed below:

Karsnitz, J. R., Graphic Arts Technology, Delmar Publishing Co., Albany, Ny, 1984, (Chapters 14-18, pp. 191-274).

Other texts and reference books which apply to this course include the following:

Broekhuizen, R. J., Graphic Communications, McKnight Publishing Co., New York, 1980, (Chapter 10, Units 42-44).

Jones, R. E., & J. L. Robb, <u>Discovering Technology: Communication</u>, Harcourt Brace Jovanovich, Publishers, Orlando, FL, 1986, (Chapters 16-20, pp. 184-232).

Seymour, R. D., J. M. Ritz, & F. A. Cloghessy, Exploring Communications, Goodheart-Willox, Inc., South Holland, IL, 1987, (Chapter 16, pp. 150-160)

Additional reference books for this module include:

Hedgecoe, A., The Book of Phot praphy, Knoff Publishers, New York, 1985, (Chapters 1-6).

LaCour, M. Plathrop, Photo Technology, ATS, Chicago, IL, 1979, (Chapters 2, 3, 20).

Rhode, R. B., & F. H. McCall, <u>Introduction to Photography</u>, 1982, (Chapters 1, 2, & 3).



GRAPHIC COMMINICATION SYSTEMS

MODULE: 6: Producing and Presenting Photographic Messages

LENGTH: 17 DAYS Communication CLUSTER

Taking family or vacation pictures and producing a photographic message are two entirely different activities. The first tries to capture a moment in history for later reference. Photographic communication uses photographs to convey information or ideas or it tries to develop attitudes or change behaviors.

Producing a photographic message takes careful planning, as was discussed in the previous module. It also requires the production of quality prints, slides, filmstrips, or motion pictures.

This module will introduce students to the equipment and films required to produce photographic messages. It will also teach students to expose and develop film and to make and mount black and white prints.

Additionally, the student will learn to display the message and assess its communication value.



OBJECTIVES

Upon completing this learning module, each student should be able to:

- 1. Describe the essential parts and operation of a common camera.
- 2. Describe the essential parts of film and their purposes.
- 3. Expose and develop a roll of film.
- 4. Describe and develop an assessment for photographic messages.
- 5. Finish and present photographs as required.

CALENDAR

DAY	ACTIVITY
1	Introduce photography as communication.
2-3	Discuss operation and procedures for camera operation.
4-5	Discuss film and its related parts and selection.
6 - 8	Introduce equipment and procedures for photographic system explored
9 - 16	Supervise and coordinate student work.
17	Summarize course.
	Collect equipment.
	Final exam or quiz.

DAY

ACTIVITY

- The storyboard developed in the previous module forms the basis for this module's work. The instructor should select, before this unit starts, which one of the photographic systems. The students will work in one of the following: black and white prints, color slides, black and white reversal, or color prints. The discussion should be based on teacher expertise, equipment and funds available, student maturity, and other local factors. The selection of the system will dictate how this particular unit is handled. The selection of system is a local concern, but the concepts of camera operation, films, exposure, development, finishing, and assessment should be presented.
- The instructor should introduce photography as a communication media. Stress the difference between "picture shooting" and photographic communication.

The student should participate in the discussion.

2-3 The instructor should discuss camera operation, including the technique of film loading/unloading and proper exposures.

The student should be provided with hands-on experience with loading/unloading film, and operation of each camera control.

4-5 The teacher should discuss the parts of film emulsions and their use and introduce film speeds, emulsion ratings, and film selection.

The teacher should also introduce activity with liquid emulsions. Using "liquid emulsion," have the students coat, expose and develop a print.

6-8 The instructor should introduce the equipment necessary for the selected photographic system. For example, if one were exploring black and white reversals, one would introduce film tanks, E-6 chemistry, and slide mounts.

The students should participate in the discussion/demonstrations on associated equipment.

9-15 The instructor shod supervise the students' work as they complete the major assignment.

The student should design, produce, and present a photographic message that meets the requirements of the assignment.

DAY ACTIVITY 16 The instructor should have the students present their assignments and have each member of the class assess the communicative value of the presentation. The student should receive the major photographic communication laboratory assignment. 17 The instructor should summarize the course and collect equipment and supplies. The student should participate in the course review.



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BIRLIOGRAPHY

The suggested text for this course (along with specific chapters/pages for this module) is listed below:

Karsnitz, J. R., Graphic Arts Technology, Delmar Publishing Co., Albany, Ny, 1984, (Chapters 14-18, pp. 191-274)

Other texts and reference books which apply to this course include the following:

Broekhuizen, R. J., Graphic Communications, McKnight Publishing Co., New York, 1980, (Chapter 10, Units 44-48).

Jones, R. E., & J. L. Robb, <u>Discovering Technology: Communication</u>, Harcourt Brace Jovanovich, Publishers, Orlando, FL, 1986, (Chapters 16-20: pp. 184-232).

Seymour, R. D., J. M. Ritz, & F. A. Cloghessy, Exploring Communications, Goodheart-Willcox, Inc., South Holland, IL, 1987, (Chapter 16: pp. 150-160).

Additional reference books for this module include:

Hedge, Cce, The Book of Photography, Knuff Publishing, New York, 1985, (Chapters 9, 20, & 21).

LaCour & Lathrop, Photo Technology, ATS, Chicago, IL, 1979, (Chapters 8-11).

Rhode & McCall, Introduction to Photography, 1982, (Chapters 12 & 13).

